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IS 7121 (1973): Carbaryl Water Dispersible Powder Concentrates [FAD 1: Pesticides and Pesticides Residue Analysis]

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IS : 7121 - 1973  
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*Indian Standard*  
SPECIFICATION FOR  
CARBARYL WATER DISPERSIBLE  
POWDER CONCENTRATES

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BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

Gr 3

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# Indian Standard

## SPECIFICATION FOR CARBARYL WATER DISPERSIBLE POWDER CONCENTRATES

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AMENDMENT NO. 2     SEPTEMBER 1976

TO

IS : 7121-1973 SPECIFICATION FOR  
CARBARYL WATER DISPERSIBLE  
POWDER CONCENTRATES

**Alteration**

( *Page 5, clause 3.3.1* ) — Substitute the following for the existing clause

**'3.3.1 Carbaryl Content** — When determined by the method prescribed in Appendix A, the observed carbaryl content, percent by mass, of any of the samples shall not differ from the declared nominal value by more than the tolerance limits indicated below

<i>Nominal Value Percent</i>	<i>Tolerance Limit</i>
Up to 9	+ 10 - 5
10 and below 50	± 5 percent of the nominal value
50 and above	+ 5 - 3

3.3.1.1 The actual value of carbaryl content shall be calculated to the second decimal place and then rounded off to the first decimal place before applying the tolerances as stipulated in 3.3.1.

( AFIDC 6 )

Reprography Unit, BIS, New Delhi, India

**AMENDMENT NO. 3      OCTOBER 1988**  
**TO**  
**IS : 7121 - 1973   SPECIFICATION FOR**  
**CARBARYL WATER DISPERSIBLE POWDER**  
**CONCENTRATES**

( *Page 4, Table 1* ) — Add the following note at the end of Table 1:

**'Note— The material shall not be subjected to accelerated storage treatment if it has crossed half of its shelf life as ascertained from its date of manufacture and date of expiry declared on the container.'**

( AFCDC 6 )

Reprography Unit, BIS, New Delhi, India

**AMENDMENT NO. 4 JULY 1994**  
**TO**  
**IS 7121: 1976 SPECIFICATION FOR CARBARYL**  
**-WATER DISPERSIBLE POWDER CONCENTRATES**

**(Page 4, Table 1):**

a) *Sl No. (ii), col 2* } — Delete the words 'after accelerated storage'  
b) *Sl No. (iii), col 2* }

*(Page 6, clause 5 1) — Substitute the following for the existing*

'When freshly manufactured material in bulk quantity is offered for inspection, representative samples of the material shall be drawn and tested as prescribed in IS 10627 : 1983 within 90 days of its manufacture. When the material is offered for inspection after 90 days of its manufacture, sampling shall be done as prescribed in IS 10627 : 1983. However, the criteria for conformity of the material when tested, shall be the limits of tolerances, as applicable over the declared nominal value and given under clause 33.1 of the **standard**.'

*(Page 7, clause A-1-2, para 2) -Incorporate the following after the line 8:*  
'In order to avoid overheating, a thermostatically controlled heating mental shall be used'

**(FAD 1)**

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Reprography Unit, BIS, New Delhi, India

*Indian Standard*  
SPECIFICATION FOR  
CARBARYL WATER DISPERSIBLE  
POWDER CONCENTRATES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 18 December 1973, after the draft finalized by the Pest Control Sectional Committee had been approved by the Agricultural and Food Products Division Council and the Chemical Division Council

0.2 Carbaryl water dispersible powders are largely used in the control of pests of agricultural importance specially insect pests of fruits, vegetables and cotton

0.3 This standard is one in the series of Indian Standards for pesticides and formulations

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard

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1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for carbaryl water dispersible powder concentrates containing varying percentages of carbaryl, technical

2. GRADES

2.1 There shall be the following two grades of the material.

- a) Ground spray grade, and
- b) Aerial spray grade

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\*Rules for rounding off numerical values (*revised*).

### 3. REQUIREMENTS

**3.1 Description** - The material shall be in the form of a homogeneous powder which shall wet readily on mixing with water, providing a suspension suitable for use as a spray. The material shall be white to off-white in colour.

**3.2 Carbaryl, technical, used in the formulation of this product shall conform to the 'Indian Standard specification for carbaryl, technical (*under preparation*)'.**

**3.3 The material shall comply with the requirements given in Table 1**

**TABLE 1 REQUIREMENTS FOR CARBARYL WATER DISPERSIBLE POWDER CONCENTRATES**

Sl. No	CHARACTERISTIC	REQUIREMENT		METHOD OF TEST, REF TO	
		Ground Spray Grade	Aerial Spray Grade	Appen- dix	Cl. No of IS 6940- 1973*
(1)	(2)	(3)	(4)	(5)	(6)
i) Carbaryl by mass	percent	Nominal value as declared on the con- tainer (see 3.3.1)	Nominal value as declared on the con- tainer (see 3.3.1)	A	—
ii) Sieving requirement, material passing through 45-micron IS Sieve, after accelerated storage, 'percent by mass, Min'		99.0	99.5	—	11.1
iii) Suspensibility after accelerated storage percent by mass, Min		60	70	—	11.2
iv) Acidity ( as $H_2SO_4$ ), percent by mass, Max or Alkalinity ( as $NaOH$ ), percent by mass, Max		0.05	0.05	—	11.3
v) Foam test:					
i) Initial volume in ml, Max		—	240	B	—
ii) Final volume( after 60 seconds ) in ml, Max		—	150	—	—

\*Methods of test for pesticides and their formulation

†See IS : 460-1962 'Specification for test sieves (*revised*). BS sieve 350, ASTM test sieve 325, Tyler 325 have their apertures within the limits specified for the above IS Test Sieve and may, therefore, be used 45-micron IS Sieve'

**3.3.1** The appropriate tolerances to be applied shall depend upon the declared percent-nominal value [see Table 1, Sl No (i), col (3) ] and they shall be as given below

<i>Sl No.</i>	<i>Nominal Value, Percent</i>	<i>Tolerance Limit , Percent</i>
i)	up to 10	+ 10 — 5
ii)	Above 10 and up to 50	+ 5 — 3 of the nominal value
iii)	Above 50	+ 5 — 3

**3.3.1.1** The actual value of the technical material in the formulation shall be calculated to the second decimal place for rounding off the first decimal place before applying the tolerance as stipulated in **2.3.1**.

#### 4 PACKING AND MARKING

**4.1 Packing** — The material shall be packed in polyethylene bags inserted in suitable cardboard cartons which are further packed in multi-ply corrugated box or in other suitable clean and dry containers with polyethylene lining

**4.2 Marking** — The containers shall be securely closed and shall bear legibly and indelibly the following information in addition to the provisions of the rules under the Insecticides Act

- a) Name of the material,
- b) Grade,
- c) Name of the manufacturer,
- d) Date of manufacture,
- e) Batch number,
- f) Net mass of contents;
- g) Nominal carbaryl content, percent by mass, and
- h) The minimum cautionary notice worded as under

'CARBARYL IS HARMFUL IF SWALLOWED. AVOID EXCESSIVE INHALATION OR SKIN CONTACT. AVOID CONTAMINATION OF FOODSTUFFS, EMPTY FOODSTUFF CONTAINERS, AND ANIMAL FEEDS. KEEP OUT OF REACH OF CHILDREN. IF POISONING OCCURS, CALL A PHYSICIAN. ATROPINE AND OXYGEN ARE USEFUL IN TREATMENT'

**4.2.1** The containers may also be marked with the ISI Certification Mark

NOTE -The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification-Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

**5 SAMPLING**

**5.1** Representative samples of the material shall be drawn as prescribed in the ' Indian Standard methods of sampling of pesticides and their formulations ( *under preparation* ) '.

**6. TESTS**

**6.1** Tests shall be carried out as prescribed in the appropriate appendices given in col 5 and col 6 of Table 1

**6.2 Quality of Reagents** — Unless specified otherwise, pure chemicals and distilled water ( see IS :1070-1960\* ) shall be employed in tests

NOTE - ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

**APPENDIX A**

[ *Table 1, Item (i)* ]

**DETERMINATION OF CARBARYL CONTENT**

**A-0. GENERAL**

**A-0.1** For the determination of carbaryl content, two methods, namely, titration method (see A-1) and colorimetric method ( see A-2 ), have been specified. Either of these methods may be used for routine testing but the colorimetric method shall be used as a referee method in case of dispute.

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\*Specification for water, distilled quality ( revised )

**A-1. TITRATION METHOD****A-1.1 Reagents****A-1.1.1 Standard Potassium Hydroxide Solution — 1·0 N.**

**A-1.1.2 Dilute Boric Acid Solution — 2 percent** Dissolve 20 g of boric acid in distilled water and dilute to one litre. Heat to 70°C, swirl, and cool to room temperature. Add 10 ml of 0·1 percent bromocresol green indicator and neutralize to a green end-point with 0·1 hydrochloric acid

**A-1.1.3 Standard Hydrochloric Acid Solution — 0·1 N, aqueous****A-1.2 Procedure**

**A-1.2.1** Assemble the apparatus as shown in Fig. 1. Introduce the right amount of sample, accurately weighed to nearest 0·1 mg, on the basis of the concentration of the product as indicated on the container (see Note ) into the flask

By means of a graduated cylinder, add 50 ml of the standard potassium hydroxide solution to the flask and add a few glass beads to ensure smooth ebullition. Apply silicone grease to the ball joint and connect the flask and condenser using a screw clamp. By means of a graduated cylinder, add to the receiver 150 ml of dilute boric acid solution. Clamp the nitrogen inlet tube securely to the column side arm, and start nitrogen flow at a rate of 50 to 80 ml per minute. Apply sufficient heat to the flask so that boiling begins in 6 to 8 minutes. Continue boiling for at least 90 minutes and this specified heating period is critical. It is imperative that the rate of heating be such that boiling begins within 6 to 8 minutes if all the volatile components are to be evolved in the 90-minute boiling period. Disconnect the receiver and nitrogen supply line and discontinue heating. Transfer the contents of the receiver into a 500-ml Erlenmeyer flask. Rinse the inside and outside of the gas delivery tube, and the inside of the receiver with boric acid solution, adding the washings to the Erlenmeyer flask

**NOTE —**

Concentration	Sample Size, g
50 percent	0·7 to 1·1
85 percent	0·4 to 0·6

**A-1.2.2** Titrate the contents of the Erlenmeyer flask with the standard hydrochloric acid solution to the original green colour of the boric acid solution. The end-point is best determined by comparing the colour to that of a blank solution of boric acid and bromocresol green

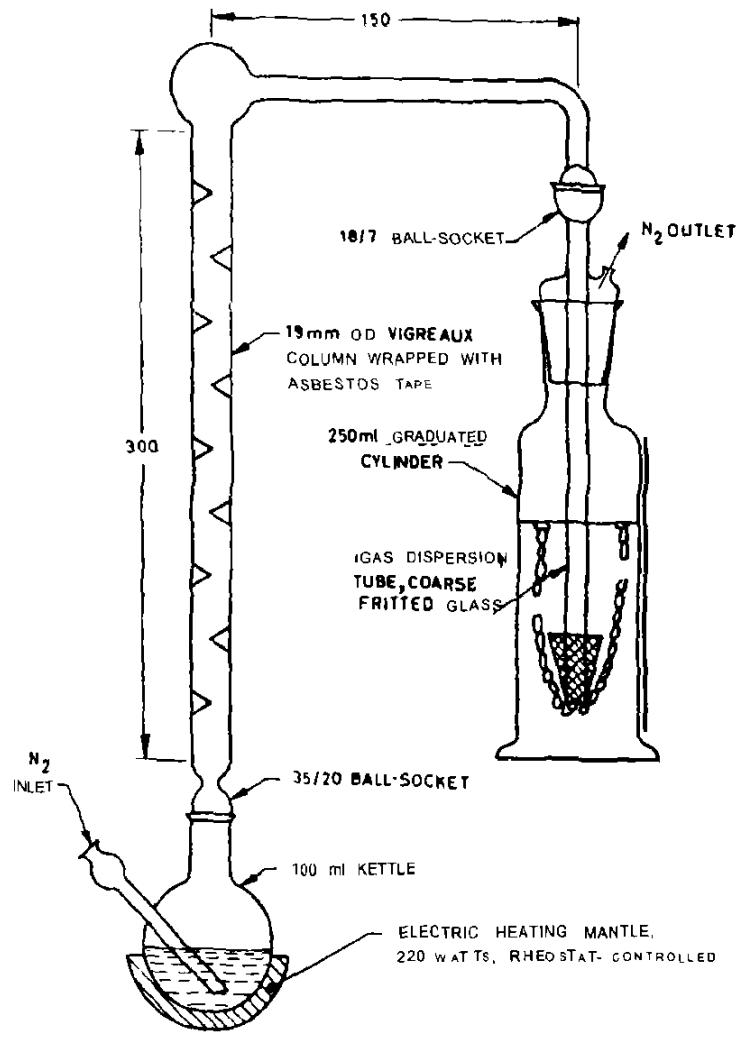


FIG. 1 APPARATUS FOR DETERMINATION OF CARRARYL CONTENT  
( TITRATION METHOD )

### A-1.3 Calculation

$$\text{Carbaryl, percent by mass} = 20.12 \times \frac{A \times N}{M}$$

where

$A$  = volume in ml of standard normal hydrochloric acid required for the titration of the sample,

$V$  = normality of the standard hydrochloric acid solution, and

$M$  = mass in g of the sample taken for the test

## A-2 COLORIMETRIC METHOD

**A-2.1 Principle of the Method** - The material is heated with methanolic sodium hydroxide. To the resultant 1-naphthol, iodine solution ( see A-2.2.3 ) is added and the violet colour thus produced is measured in a colorimeter and the carbaryl content is calculated by running a sample of analytical grade carbaryl along with the material under analysis.

### A-2.2 Reagents

**A-2.2.1 Methyl Alcohol** — distilled, boiling range 64 to 65°C

**A-2.2.2 Standard Methanolic Sodium Hydroxide Solution** — 0.5 N, prepared by weighing 10 g of sodium hydroxide pellets, dissolving in 10 ml of water and making up 500 ml with distilled methanol in a volumetric flask

**A-2.2.3 Colour Reagent Solution** — Prepared by dissolving 1.27 g of iodine, 4 g of potassium iodide in 50 ml water in a beaker. This is then transferred to a 100-ml volumetric flask, shaken well and made to the mark with water. It is to be ensured that all iodine goes into solution. This solution is diluted ten times its volume in water. This diluted solution is used for developing colour

### A-2.3 PROCEDURE

**A-2.3.1 Preparation of Sample Solution** — Weigh enough material containing carbaryl close to 0.06 g in a 100-ml Erlenmeyer flask. Pipette exactly 1 ml of standard methanolic sodium hydroxide solution followed by 10 ml methyl alcohol into the flask. Heat to boil. Transfer the solution quantitatively into 100-ml volumetric flask. Wash the Erlenmeyer flask with methyl alcohol two or three times and add washings to the volumetric flask and finally make up to the mark with methyl alcohol. Pipette out 5 ml of the above stock solution into 500-ml volumetric flask. Add 300 ml of water and 20 ml of colour reagent solution, and finally make up to the mark with water. Shake well.

**A-2.3.2 Preparation of Standard Carbaryl Solution** — Weigh carbaryl, analytical grade ( see Note ), close to 0.06 g in 100-ml Erlenmeyer flask and proceed as described in A-2.3.1.

**Note** -- Carbaryl, analytical grade, may be prepared by repeated recrystallization of carbaryl, technical, from toluene

**A-2.3.3 Preparation of Blank Solution** — Weigh the same amount of carbaryl, formulation that is equivalent to the sample weighed for analysis of carbaryl content. Transfer to 100-ml volumetric flask and make up to the mark with methyl alcohol. Shake well. Pipette out 5 ml of this solution to 500-ml volumetric flask containing 20 ml of colour reagent solution and 300 ml of water. Make up to the 500-ml mark with water. Shake well and use this solution as blank.

**A-2.3.4 Measurement of Absorbance** — Take the above three solutions to the colorimeter and fill one of the cells with the blank solution and adjust the colorimeter to zero absorbance at wavelength of 540 nm. Fill another cell with standard carbaryl solution and measure the optical density at 540 nm. Similarly, measure the optical density for the sample solution.

**NOTE** — Measurement of optical density shall be carried within 15 minutes after addition of colour reagent.

#### A-2.4 -Calculation

$$\text{Carbaryl content, percent by mass} = \frac{A \times B}{C \times D} \times 100$$

*A* = mass in g of the material in standard solution,

*B* = optical density of sample,

*C* = mass in g of the material in sample solution, and

*D* = optical density of the standard solution

## APPENDIX B

[ *Table 1, Item (v)* ]

### FOAM TEST

#### B-1. REAGENTS

**B-1.1 Standard Hard Water** — Prepared by dissolving 0.304 g of anhydrous calcium chloride and 0.139 g of magnesium chloride hexahydrate in one litre of distilled water.

#### B-2 PROCEDURE

**B-2.1** Weigh  $8.0 \pm 0.1$  g of the sample and transfer it to a 250-ml graduated glass stoppered cylinder. Add 100 ml of the standard hard water and allow the sample to wet thoroughly. Stopper the cylinder and shake vigorously for 30 seconds. Place the graduated cylinder on a vibration free bench and immediately record the total volume of liquid and foam in millilitres. Allow the cylinder to stand for 60 seconds and again record the total volume of liquid and foam in millilitres. Report the two volumes in millilitres.

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**AMENDMENT NO. 1 AUGUST 1975**

**TO**

**IS : 7121-1973 SPECIFICATION FOR  
CARBARYL WATER DISPERSIBLE  
POWDER CONCENTRATES**

**Alterations**

*(Page 7, clause A-1.1.1) — Substitute the following for the existing clause:*

*'A-1.1.1 Standard Potassium Hydroxide Solution — 1.0 N, prepared by dissolving 66 g of potassium hydroxide in 10 ml of distilled water. Dilute to 1 litre with diethylene glycol.'*

*(Page 7, clause A-1.1.2, last sentence) — Substitute '0.1 N hydrochloric acid' for '0.1 hydrochloric acid'.*

**( AFCDC 6 )**

**Reprography Unit, BIS, New Delhi, India**